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Modern Treatment Modalities For Patellar Fractures And Literature Reviews.

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Abstract:
Patellar fracture is a common injury caused by excessive tension through the extensor mechanism or a direct impact. The intact patella increases the leverage and efficiency of the extensor mechanism and articulates with the femoral trochlea. Undisplaced fractures can be treated non operatively. Surgical treatment is recommended for fractures that either disrupt the extensor mechanism or have >2 to 3 mm step-off and >1 to 4 mm of displacement. Anatomic reduction and fixation with a tension-band technique is associated with the best outcomes. Symptomatic hardware is the most common complication following operative treatment. Open fractures are associated with more complications than closed fractures.
These complications can be managed by timely debridement,irrigation and internal fixation. Functional impairment remains common after treatment of patella fractures. The purpose of this article is to reviewed 100 of literatures and modern treatment strategies to help optimize the management of patients with such patella fracture.

Key words:-*Patellar fracture, Extensor mechanism, Symptomatic hardware.*

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I. Introduction:

Patellar fractures represent approximately 1% of all skeletal injuries. [1,2] The patella is the largest sesamoid in the body and functions to increase the moment arm of the extensor mechanism of the quadriceps by 30%. The cartilage on the articular surface of the patella is among the thickest in the human body, measuring up to 5.5 mm. [2,4] Treatment goals for patella fractures include restoring the function of the extensor mechanism, minimizing patellar bone loss, maximizing articular congruity, and allowing early mobilization. [2,5,6]

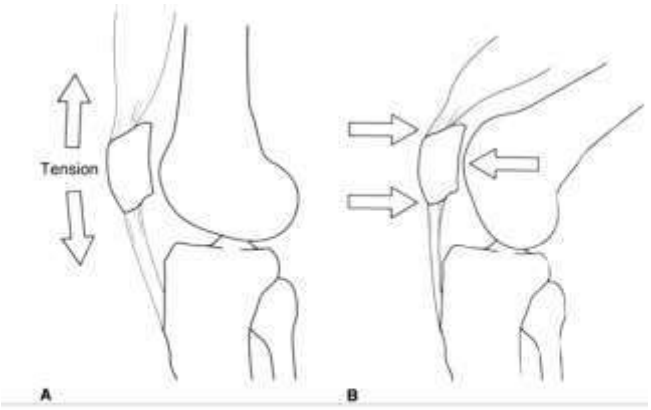
Patella fractures can oceur as a result of either an indireet or a direct mechanism. The indirect mechanism typically results in a transverse fracture, produced when the force exerted by the extensor mechanism exceeds the tensile strength of the patella.[7] Comminuted fractures comprise 55% of surgically treated patella fractures. [1,6] Operative treatment of comminuted patella fractures presents a significant challenge to surgeons.[8] Displaced comminuted fracture treated by surgery extensor mechanism is disrupted, greater than 2 to 3 mm of articular step-off, and greater than 1 to 4 mm of displacement. [1,2] Failure to restore the articular surface contour results in post-traumatic arthritis.[9]

Functional outcome measures were post operatively collected at 3, 6, and 12 months following surgical fixation of unilateral patella fractures in 30 patients. Twenty-four patients (80%) experienced anterior knee pain during activities of daily living. At 12 months, objective testing demonstrated that, compared with the uninjured knee, the knee extensor mechanism.

Mechanism of injury:

Patellar fracture may occur as a result of direct or indirect forces. The type of force determines the fracture pattern. A direct force consists of a direct blow to the anterior knee, which often results from a fall or dashboard injury.[6] This mechanism causes the patella to fail in compression, resulting in a comminuted or

stellate fracture pattern.Although>50% of these fractures are non-displaced, with the extensor mechanism remaining intact, significant chondral damage may occur. [1]



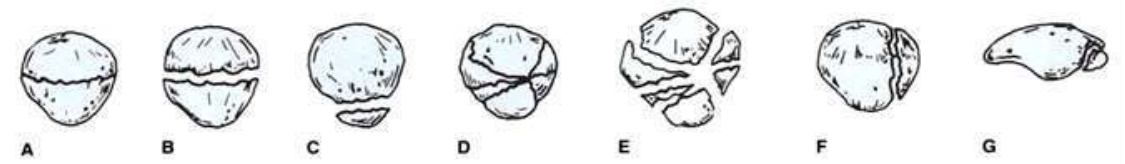
A, The patella is loaded primarily in tension with the knee in full extension. **B,** During flexion, the patella experiences a combination of tension, compression and three-point bending forces (arrows). (Reproduced with permission from Carpenter JE, Kasman R, Matthews LS: Fractures of the patella. *J Bone Joint Surg Am* 1993;75:1550-1561.)

Fig :1:

More commonly, the patella fails in tension as indirect force from the extensor mechanism exceeds the strength of the bone.[6] Typically, this fracture type is caused with rapid knee flexion against a fully contracted quadriceps muscle, resulting in transverse fracture or avulsion of the inferior pole.The force often continues beyond the patella, extending in a transverse fashion through the retinaculum and causing fracture displacement and loss of active knee extension.[6]

Classification:

Patellar fractures may be classified as displaced (i.e. step-off >2 to 3 mm and fracture gap >1 to 4 mm) or nondisplaced.[6] Classification often predicts treatment. However, more commonly, patellar fractures are classified descriptively according to fracture pattern, which may offer information regarding the mechanisms of injury but does not direct treatment. [1,6](Figure 4).The Orthopaedic Trauma Association classification is based on degree of articular involvement and number of fracture fragments; however, the clinical utility of this system is uncertain.

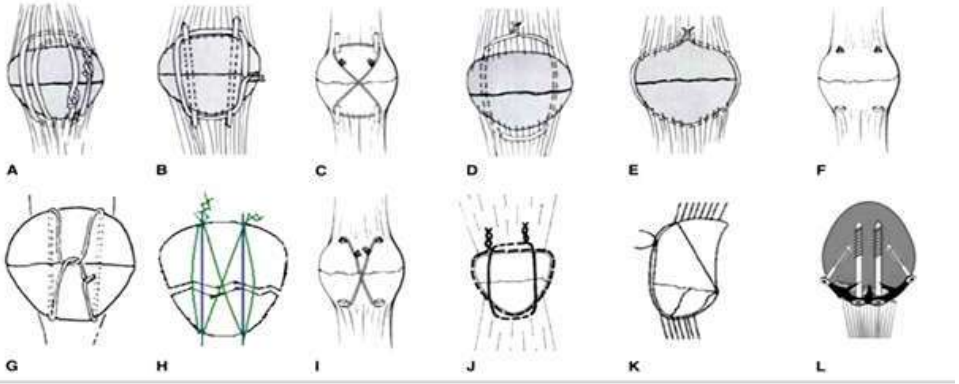


Descriptive classification of patellar fractures. **A,** Nondisplaced. **B,** Transverse. **C,** Lower or upper pole. **D,** Multi-fragmented nondisplaced. **E,** Multifragmented displaced. **F,** Vertical. **G,** Osteochondral. (Adapted with permission from Harris RM: Fractures of the patella and injuries to the extensor mechanism, in Bucholz RW, Heckman JD, Court-Brown CC, eds: *Rockwood and Green's Fractures in Adults*, ed 6. Philadelphia, PA, Lippincott Williams & Wilkins, 2006, vol 2, p 1974.)

Fig:2:

The goals of management include restoring the extensor mechanism while maximizing articular congruency. Every effort should be made to preserve as much patellar bone as possible. on the injured side had an average 41% deficit in strength,47% deficit in power, and 34% deficit in endurance.[10] In another study, involving 40 patients who underwent surgical treatment of an isolated, unilateral patella fracture with an average follow-up of 6.5 years (range, 1.25-17 years), investigators found that significant symptomatic complaints and functional deficits persisted based on validated outcome measures as well as objective physical evaluations.[11] Removal of symptomatic hardware was performed in 52% of the patients treated with osteo-synthesis, whereas 38% of the patients with retained hardware reported implant-related pain at least some of the time.Eight patients (20%) had an extensor lag greater than 5°, 15 patients (38%) had a restricted range of

flexion greater than 70° and 6 patients (15%) had a restricted range of extension greater than 5°. Patients had an average isometric extension deficit of 26% between the uninvolved and involved sides for peak torque. Mean normalized SF-36 physical composite score and mean normalized Knee Injury and Osteoarthritis Outcome Scores subscale scores were statistically different (P<.05) from reference population norms.



Illustrations of patellar fixation techniques. **A,** Standard tension band. **B,** Modified anterior tension band (MATB). **C,** MATB with vertical figure-of-8 wire. **D,** Magnusson wiring. **E,** Cerclage wiring. **F,** Parallel cancellous lag screws. **G,** Lotke longitudinal anterior band. **H,** MATB with horizontal figure-of-8 wire. **I,** Figure-of-8 tension band through cannulated screws. **J,** Pyrford technique. **K,** Separate vertical wiring (lateral view). **L,** Basket plate. (Panels A, B, D, and E reproduced with permission from Weber MJ, Janecki CJ, McLeod P, Nelson CL, Thompson JA: Efficacy of various forms of fixation of transverse fractures of the patella. *J Bone Joint Surg Am* 1980;62:215-220. Panels C, F, and I reproduced with permission from Carpenter JE, Kasman RA, Patel N, Lee ML, Goldstein SA: Biomechanical evaluation of current patella fracture fixation techniques. *J Orthop Trauma* 1997;11:351-356. Panel G reproduced with permission from Hughes SC, Stott PM, Hearnden AJ, Ripley LG: A new and effective tension-band braided polyester suture technique for transverse patellar fracture fixation. *Injury* 2007;38:212-222. Panel H reproduced with permission from John J, Wagner WW, Kuiper JH: Tension-band wiring of transverse fractures of patella: The effect of site of wire twists and orientation of stainless steel wire loop. A biomechanical investigation. *Int Orthop* 2007;31:703-707. Panel J reproduced with permission from Chatakondu SC, Abhaykumar S, Elliott DS: The use of non-absorbable suture in the fixation of patellar fractures: A preliminary report. *Injury* 1998;29:23-27. Panel K reproduced with permission from Yang KH, Byun YS: Separate vertical wiring for the fixation of comminuted fractures of the inferior pole of the patella. *J Bone Joint Surg Br* 2003;85:1155-1160. Panel L reproduced with permission from Kastelec M, Veselko M: Inferior patellar pole avulsion fractures: Osteosynthesis compared with pole resection. *J Bone Joint Surg Am* 2004;86:696-701.)

Fig :3:

Imaging:

Typically, fracture classification and treatment decisions are based on quality anteroposterior and lateral radiographs of the knee, with advanced imaging rarely being indicated.[2] However, a recent study by Lazaro et al[12] found that classification according to the AO/OTA system was modified in 66% of cases and treatment plans were changed for 49% of patients after obtaining computed tomography scans. Most commonly, they identified a severely comminuted distal pole fracture, which was missed on nearly half of plain films.

Treatment Modalities:

A) Nonsurgical:

Nonsurgical management is indicated for fractures with a clinically intact extensor mechanism and minimal step-off and/or fracture displacement (<2 to 3 mm and <1 to 4 mm, respectively).[1,6] Successful results have been reported with two different treatment regimens.

Braun et al [9] retrospectively reviewed 40 nonsurgically managed fractures with an intact extensor mechanism and <1 mm of fracture displacement. Fractures were managed with a long leg splint for a few days followed by partial weight bearing and physiotherapy. At an average follow-up of 30.5 months, 80% of Patients were pain free, and 99% had full range of motion (ROM). In a large series, Boström[1] used plaster immobilization for a mean duration of 4 weeks to manage patellar fractures with an intact extensor mechanism, <3 mm of articular step-off, and <4 mm of fracture widening. Good or excellent outcomes were reported in 99% of fractures at a mean 9 year follow-up (210/212).

These reports suggest that good to excellent results can be expected for minimally displaced fractures with an intact extensor mechanism. We typically recommend early weight bearing with a hinged knee brace locked in extension. Isometric quadriceps exercise and straight leg raises are begun when pain has subsided. Active and active-assisted ROM is begun at 1 to 2 weeks, and resistance exercises are added at 6 weeks. One week after motion is allowed, radiographs are obtained to evaluate for displacement.

Nonsurgical management should be considered for displaced patellar fractures in the patient with significant medical comorbidities. Pritchett[10] reported a series of 18 patellar fractures with > 1 cm of displacement managed with a Velcro closure splint, early full weight bearing, and straight leg raises. Of the 12

patients available at 2-year follow-up, only 3 considered their outcome to be poor. No patient had severe pain, but all patients had extensor lag of≥20°.

Prolonged immobilisation can nesult in knee joint stiffness,quadriceps atrophy and joint adhesions.[9] More recently Melvin and Mehta recommended weight bearingas tolerated in a knee immobilizer locked in extension with straight leg raises. whentolerated followed by active and active assistance, range of motion in 1 to 2 weeks and resistance activities at 6 week. Non operative management should be considered when significant patient comorbidities make operative intervention perilous.[2]

B) Surgical treatment:

An incompetent extensor mechanism is the most common indication for surgery. In some cases, despite active knee extension, fracture separation >1 to 4 mm or step-off >2 to 3 mm may be relative indications for surgical management. Additional surgical indications include intra-articular loose bodies and osteochondral fracture. Numerous treatment methods, including partial excision, tension band, modified tension band, oblique band, Modified horizontal oblique tension band, osteosynthesis with plates and screws, suture repair, cerclage wiring, per-cutaneous open reduction and internal fixation, total patellectomy, arthroscopic-assisted open reduction and internal fixation, and external fixation, have been used for patella fractures.[2,5,6,14-16] A recent review found little high-qualty evidence comparing operative treatment modalities for patella fractures and a similar paucity of evidence comparing operative with nonoperative treatment.[17]

a) Open Reduction and Internal Fixation:

Although the techniques and materials used in patellar fixation have changed substencely, the goals of restoration of normal anatomy and extensor function remain constant. [1,11] Several incisions may be used to expose the patella; however, a longitudinal midline extensile incision centered over the patella is preferred. For transverse fractures, full-thickness medial and lateral flaps allow access to retinacular tears while enabling palpation to confirm reduction of the joint surface, Gardner et al.[12] advocated lateral parapatellararthrotomy with internal rotation of the patella to 90° for direct visual reduction of comminuted fractures.

b) Tension Band Fixation:

Tension-band wiring has been the most commonly used technique for the management of patellar fracture. This technique converts the anterior tension forces produced by the extensor mechanism and knee flexion into compression forces at the articular surface, promoting fracture healing. [5,18] Although tension band fixation per the classic AO technique is reserved for simple fractures, certain comminuted fractures can also be treated with a tension band construct if the posterior cortex is intact to allow for compression.[18] Surgical fixation is typically performed through an anterior longitudinal incision augmented as needed by full-thickness medial and lateral flaps. Some authors have advocated a lateral parapatellar approach to allow improved exposure of the fracture for reduction and fixation; exposure of the fracture for reduction and fixation; however, a transverse approach should not be used unless an open wound dictates otherwise.[19,20] Tension band fixation allows early motion, which has been found to improve outcomes and decrease post traumatic arthritis. [18,20,21] The classic AO technique described in the 1950s consists of 2 parallel vertical Kirschner wires with a tension band passing anteriorly over the patella and posterior to the Kirschner wires.[18,20] Use of a large-bore plastic catheter can he helpful in passing the tension band wire posterior to the vertical Kirschner wires. This technique has been found to be associated with prominent implants requiring hardware removal, implant migration, muscular atrophy, and loss of reduction.[7,21]

Fig-4 :A: Lateral View of transverse fracture of right patella **B:** A/P view of a modified tension band technique with figure of '8'

Berg[21] reported that a modified tension band technique using parallel vertical cannulated screws resulted in union in all 10 patients, including 3 revision cases. with 70% good to excellent outcomes and no loss of reduction, implant migration, or implant failure. Tian et al[22] performed a retrospective review comparing a modified tension band technique using Kirschner wires with a modified tension band technique using cannulated screws. They found improved fracture reduction, a reduced healing score, and better lowa knee scores with the cannulated screw modification. Additionally, the implant migration rate and the second operation rate were 15.4% and 5.7%. respectively, for the Kirschner wire, with no complications in the cannulated screw cohort. In a cadaveric study, Carpenter et al[23] found that a modified tension band with cannulated screws had a higher load to failure than cannulated screws alone or a modified tension band with Kirschner wires.

Gosal et al[24] compared stainless steel wire with braided polyester using the Kirschner wire tension band technique. The reoperation rate for the steel wire group was 38%, compared with 6% for the braided polyester group. The current recommendation for transverse patella fractures is figure-of-8 tension band wiring with vertical cannulated screws. [2]

c) Oblique Tension band with cerclage wire fixation :-

Newer Technique for the severely comminuted fracture of patella.Several pieces (8-10) of the patella are arranged according to such anatomical position that there are2 parallel k.wire placed obliquely just from position of midline where vertically & horizontally placed. After that cerclage wiring is done. Fig: 6, The Union of fracture fragments occurred within 3.5 months.Uniting # patella shows physically ROM (0- 120°) flexion &no extension leg afterfollow up within 6 months without any episode of physiotherapy.

Fig-5 : a) X-ray shows Comminuted fracture fragment. b) X-ray shows oblique tension band along with cerclage wiring with callous formation after 6 months of fixation.

d) Cerclage Wire Fixation:

Yang et al[25] described a titanium cable cerclage wiring technique that they used to treat displaced comminuted patella fractures in 21 patients. They had 1 case of cerclage wire breakage and 100% good to excellent results with 100% union rates. Matsuo et al[26] performed cerclage wire fixation including the surrounding soft tissue in their repair of 5 patients with comminuted fractures and reported an 80% union rate with 1 inferior pole nonunion and no extensor lag. They stated that incorporating the soft tissues into their repair permitted the use of this technique for comminuted fractures not amenable to tension band fixation.

Fig-6 : a) Flexion movement (0°-120°)**b)** Flexion movement (0°-120°)

e) Plate Fixation:

Small plates can be applied to the anterior surface of the patella in the setting of comminution to provide additional stability (Figure 2). Taylor et al[27] recently reported techniques and outcomes of plate fixation for patella fractures. They presented 8 patients with patella fractures or nonunions treated with a combination of plate and interfragmentary screw fixation. All of their patients went on to union at a mean of 3.2 months with an average total arc of knee motion of 129°. There were no cases of hardware removal for symptomatic implants. A 2.7-mm, fixed-angle plating construct was evaluated by Thelen et al[28] for transverse patella fractures in cadavers and compared with Kirschner wire tension band fixation and cannulated screw tension band fixation. After 100 cycles of full extension to 90° of flexion, the fixed-angle plating group averaged less than 1 mm of displacement, compared with 7.1 and 3.7 mm in the Kirschner wire and cannulated screw tension band groups, respectively.

Banks et al[29] compared the tension band construct with cannulated screws with a tension band construct with a locking plate in a cadaveric transverse patella fracture model. The locked plate tension band models had similar load to failure, significantly higher ultimate fixation strength, and slightly lower stiffness at final loading compared with the cannulated screw tension band construct. In a foam patella model, Wurm et al[30] loaded simulated patella fractures fixed with locked plating or tension band fixation to failure in a simulated walking test.They found that the tension band construct had a 33% lower load to failure and 5 times larger fracture gap displacement than the locking plate construct. The use of a titanium mesh, used in craniomaxillofacial surgery as a buttress for fracture fixation, has also been proposed for patella fracture fixation (Figure 3). Benefits of this implant include that it is easily contoured, has multiple holes for screw placement, and is very low profile. In a biomechanical study, Dickens et al[31] found that, compared with, standard tension band fixation, the titanium mesh fixation construct maintained a smaller fracture gap prior to failure.[31]

f) Isolated Interfragmentary Screw Fixation:

Little has been published in the literature on isolated screw fixation for patella fractures. Wang et al[32] published a retrospective review of transverse patella fractures involving 37 patients treated with modified tension bands compared with 35 patients treated with parallel interfragmentary screws in a lag by design fashion. They found parallel titanium screw fixation to have a shorter operative time, a lower loss of fixation, and lower rates of symptomatic hardware and second surgery.

Tandogan et al[9] reported on 5 patients with displaced patella fractures without extensor mechanism disruption treated with arthroscopic assisted reduction and percutaneous screw fixation. Their technique returned all but 1 patient to full range of motion with no implant failure or infection. Cadaveric studies have demonstrated that cannulated screws have a lower load to failure than cannulated screws with a modified tension band technique.[23]

g) Inferior Pole Fracture Treatment:

Avulsion fractures of the inferior patella account for 9% to 22% of surgically treated patella fractures. These fractures are often comminuted, making treatment difficult.[33] Kastelec and Veselko[33] compared the results for 14 patients who had internal fixation of an inferior patella fracture with a basket plate with 14 patients who were treated for the same injury with patellar pole excision and direct patellar tendon repair. At an average of 4.6 years postoperatively, the basket plate group had significantly less pain, a higher activity level, and better knee range of motion than the patients who underwent excision and patellar tendon repair. Patella baja was seen in all but 3 patients in the excision and repair group and was associated with poor functional outcomes. Separate vertical wiring specifically oriented for inferior pole fractures resulted in 100% union in one study of 25 patients with inferior pole patella fractures. 34 Partial patellectomy is typically best reserved for comminuted inferior pole fractures not amenable to fixation.[2] Egol et al[35] compared a cohort of 13 patients with displaced distal pole patella fractures treated with partial patellectomy with a control cohort with central patella fractures treated with tension band techniques. At 1 year, there were no differences between the 2 groups except for more symptomatic hardware requiring intervention in the tension band group. They concluded that suture fixation of distal pole patella fractures is an acceptable technique that yields outcomes similar to tension band treatment of patella fractures.

h) Partial Patellectomy:

A partial patellectomy is performed by first excising comminuted bone fragments and then passing nonabsorbable braided suture from the patellar tendon through drill holes in the patella, similar to a traditional patellar tendon repair (Figure 4). Bone fragments can often be incorporated into the repair. Partial patellectomy has been described as a means to preserve the moment arm of the patella resulting in less loss of strength, ligament instability, and quadriceps atrophy when compared with total patellectomy[35] Bonnaig el al[37]

compared 26 patients who underwent patella open reduction and internal fixation with 26 patients who underwent partial patellectomy and found no difference in outeomes between the 2 groups. In their study, partial patellectomy was only performed when the treating surgeon felt that an anatomic reduction was not possible.

i) Minimally Invasive and Percutaneous Techniques:

Percutaneous treatment of patella fractures has been proposed as a means to preserve vascular supply and to decrease insult to the soft tissue envelope. In a randomized, controlled trial of 53 patients, Luna-Pizarro et al.[38] compared the percutaneous patellar osteosynthesis system technique with open surgery for operative patella fractures. They found that the percutaneous patellar osteosynthesis system resulted in shorter surgical time, less pain, better range of motion, fewer complications and similar functional scores at 2 years postoperatively.

A minimally invasive technique for tension band fixation of transverse patella fractures using the cable pin system (Cable-Ready, Zimmer, War-V saw, Indiana) was evaluated by Mao et al.[39] A total of 31 patients were followed for an average of 21 months. Fracture union occurred at a mean of 7.2 weeks with an average of 91° of active flexion at that time. Full range of motion was achieved in 93.5% of the patients at final follow-up and excellent results in 30 of 31 patients.

j) External Fixation:

Wardak et al.[14] used a compressive external fixation system for the treatment of 84 displaced primarily transverse patella fractures, of which 31% were open fractures, in Afghanistan. The device was left in place for a total of 6 weeks on average and then removed in a clinic, at which time all fractures had attained union. Pin tract infection and/or wire site irritation occurred in 12% but resolved after device removal without further surgical procedures. Articular surface incongruity of 2 mm or greater was seen in 11% of patients, all of whom had radiographic evidence of arthritis at 18 months postoperatively. No secondary surgical procedures were required. The authors concluded that their compression external fixation system was a safe and effective method for treating patella fractures, especially in cases with a poor soft tissue envelope, in salvage situations, and in locations with limited resources.[14]

k) Combination Fixation:

Some severely comminuted patella fractures may not be amenable to tension band, external fixation, or cerclage wire fixation. To date, little has been published in the literature about the use of combination fixation to include plate and screw Osteosynthesis with or without cerclage or tension band fixation. The current authors have found that combining treatment strategies in the setting of significant comminution, especially for high-demand patients in whom partial patellectomy may produce a poor outcome, leads to favorable results (Figure 5). Which may be fixed with oblique tension band with cerclage wire fixation.

l) Total Patellectomy:

Total patellectomy is primarily of historical interest and is rarely performed, being reserved for instances of substantial bone loss or as a salvage procedure.[1,2] Complete patellectomy eliminates the mechanical advantage provided by the patella to the extensor mechanism and results in a 49% reduction in knee extension strength.[7,36] A modified technique described by Günal et al[40] using a vastusmedialis advancement resulted in less pain, less activity limitation, better quadriceps strength, improved cosmesis, and better functional performance than patellectomy alone. However, the authors stated that the patella should be preserved if possible.

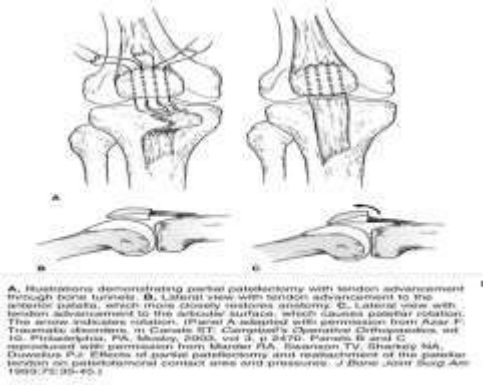


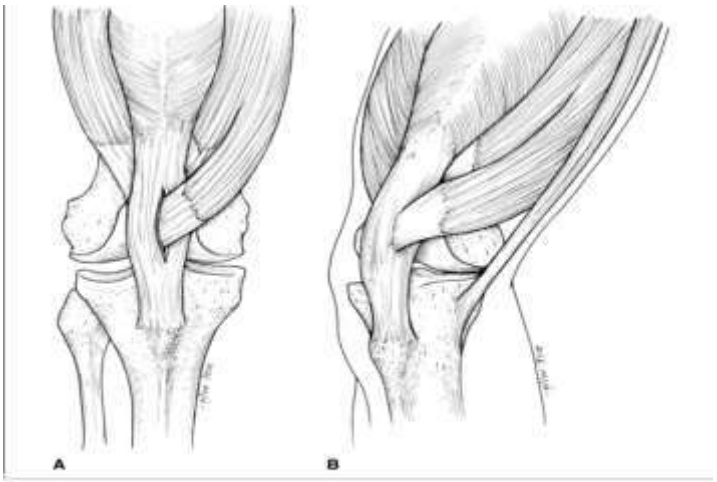
Fig-7 :

OPEN FRACTURES:

The patella remains subcutaneous throughout its length, and patella fractures are open 6% to 13% of the time.[2,41] Open patella fractures tend to result from higher energy mechanisms than closed patella fractures, with motor vehicle accidents causing 94% of open patella fractures and falls causing 62% of closed patella fractures in the same study.[41] Additionally, associated injuries occur in 81% of open fractures compared with 31% of closed patella fractures.[41] Treatment of open patella fractures should follow the same principles as treatment of all open fractures timely, appropriate antibiotics followed by urgent irrigation and thorough debridement with definitive fixation and wound closure as soon as possible.[2,41] Outcomes following open patella fractures are typically inferior to those following closed patella fractures. However, 65% to 77% good to excellent results have been obtained. Secondary procedures are more common in open patella fractures (up to 65%), and delayed wound coverage/closure is associated with increased risk of deep infection.[41-43]

COMPLICATIONS:

Patient factors have a direct effect on outcomes after surgical treatment of patella fractures history of a cerebrovascular accident has been found to induce a 6-fold increased risk of infection and a nearly 15-fold increased risk of non-union. Diabetic patients have more than an 8 times increased likelihood of reoperation for all causes.[44] Symptomatic hardware, especially in patients treated with a tension band, is common and may occur in up to 60% of patients, often resulting in the need for hardware removal.[2,25] Hardware failure occurs in 8% to 22% of patients, most commonly when Kirschner wires are used, and both local and distant hardware migration has been described.[45-47] Higher fixation failure rates have been found with increasing patient age and use of Kirschner wires with or without tension band fixation. Increasing duration of follow-up is associated with reoperation and hardware removal, indicating that patellar fixation implants may become more noticeable and symptomatic as time increases after surgery.[48]



Illustrations demonstrating the anterior (**A**) and medial (**B**) view of total patellectomy with advancement of the vastus medialis obliquus muscle over a longitudinally closed defect. (Redrawn with permission from Günal I, Taymaz A, Köse N, Göktürk E, Seber S: Patellectomy with vastus medialis obliquus advancement for comminuted patellar fractures: A prospective randomised trial. *J Bone Joint Surg Br* 1997;79:13-16.)

Fig-8

After operative treatment, nonunion and delayed union occurs in 2% to 12.5% of patients and the infection rate ranges from 0 to 5%; both are increased in open fractures. Knee stiffness can best be mitigated by solid fixation and early range of motion. Postoperative radiographic and clinical osteoarthritis are both more common following displaced patella fractures than in the general population and are best minimized by anatomic reduction, solid fixation, and early range of motion.[2,21]

REHABILITATION:

Although numerous clinical protocols have been described, there has been minimal research about the outcomes of specific clinical protocols.[2,20] Most surgeons recommend gentle early knee range of motion and full weight bearing in a knee brace locked in extension. Flexion is typically allowed to 30° within 2 weeks following surgical fixation with progressive advancement. This may be delayed in cases of extensive comminution or tenuous fixation.[2,20]

II. CONCLUSION:

Patella fractures represent a broad spectrum of injuries ranging from subtle nondisplaced fractures to open comminuted fractures with significant bone loss. Treatment should be directed to obtaining an anatomic reduction and using a fixation method that maximizes stability while minimizing hardware prominence. Surgeons should select fixation techniques that best address the fracture pattern being treated, as there is little high-quality evidence comparing treatment methods. Despite all of the advances in surgical treatment options, functional impairment, pain, and decreased quadriceps strength and endurance persist to 12 months postoperatively and beyond.[10] Knee joint mobilization and range of motion as early as fixation stability permits will help to minimize post traumatic arthritis and allow optimal postoperative recovery.

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